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Non-LTE analysis of the formation of KI lines in the spectra of A-K stars

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Abstract

The non-LTE formation of KI lines in the spectra of A-K stars is analyzed. The computations are based on a 36-level model of the neutral potassium atom for blanketed LTE Kurucz model atmospheres with Teff= 4000-10000 K, logg = 0.0-4.5, and [M/H] = (0.0)-(-2.0). The KI atoms in the atmospheres of these stars are in states of moderate and strong "over-recombination." A number of atomic parameters are refined using the profiles and equivalent widths of five lines in the solar spectrum. The classical van der Waals damping constants must be increased by factors of 2-60 to fit the observed profiles. The non-LTE solar potassium abundance - log∈ (K) = 5.14 - corresponds to the meteoritic abundance. Non-LTE corrections to the potassium abundance are important and equal to -0.4...-0.7 dex for the λ7699 Å line and -0.15...-0.3 dex for the λλ12522, 12432, and 11769 Å lines. © 2000 MAIK "Nauka/Interperiodica".